Electronic TUBES

6DT6 - 3DT6 - 4DT6

PENTODE

FOR FM DETECTOR APPLICATIONS

DESCRIPTION AND RATING

The 6DT6 is a miniature sharp-cutoff dual-control pentode primarily intended for use as an FM detector in television receivers. It is also suitable for use in delay circuits, gain-controlled amplifier circuits, and mixer circuits.

As an FM detector, the 6DT6 performs the combined functions of limiter and detector when used in conjunction with suitable circuitry. It also exhibits high sensitivity, and is capable of providing high audio output voltage.

Except for heater ratings, the 3DT6 and 4DT6 are identical to the 6DT6. In addition, they incorporate a controlled heater warm-up characteristic, which makes them especially suited for use in television receivers that employ series-connected heaters.

GENERAL

ELECTRICAL

Cathode—Coated Unipotential	3DT6	4DT6	6DT6	
Heater Voltage, AC or DC	3.15	4.2	6.3	Volts
Heater Current	0.6	0.45	0.3	Amperes
Heater Warm-up Time*	11	11	...	Seconds

Direct Interelectrode Capacitances, approximate†

Grid-Number 1 to Plate	0.02	μμf
Grid-Number 3 to Plate	1.4	μμf
Grid-Number 1 to All Except Plate	5.8	μμf
Grid-Number 3 to All	6.1	μμf
Grid-Number 1 to Grid-Number 3	0.1	μμf

MECHANICAL

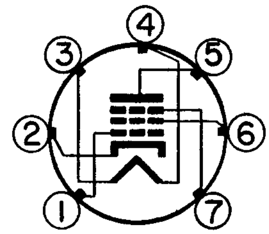
Mounting Position—Any
Envelope—T-5½, Glass
Base—E7-1, Miniature Button 7-Pin

MAXIMUM RATINGS

FM DETECTOR SERVICE—DESIGN-CENTER VALUES

Plate Voltage	300	Volts
Suppressor Voltage	25	Volts
Screen-Supply Voltage	300	Volts
Screen Voltage—See Screen Rating Chart		
Positive DC Grid-Number 1 Voltage	0	Volts
Plate Dissipation	1.5	Watts
Screen Dissipation	1.0	Watts
Heater-Cathode Voltage		
Heater Positive with Respect to Cathode		
DC Component	100	Volts
Total DC and Peak	200	Volts
Heater Negative with Respect to Cathode		
Total DC and Peak	200	Volts
Grid-Number 1 Circuit Resistance		
With Fixed Bias	0.25	Megohms
With Cathode Bias	0.5	Megohms

BASING DIAGRAM

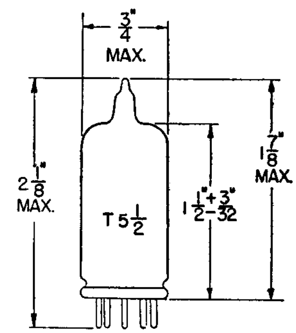


RETMA 7EN

TERMINAL CONNECTIONS

Pin 1—Grid Number 1
Pin 2—Cathode and Internal Shield
Pin 3—Heater
Pin 4—Heater
Pin 5—Plate
Pin 6—Grid Number 2 (Screen)
Pin 7—Grid Number 3 (Suppressor)

PHYSICAL DIMENSIONS



RETMA 5-2

GENERAL ELECTRIC

Supersedes ET-T1313, dated 2-56

CHARACTERISTICS AND TYPICAL OPERATION

CLASS A_1 AMPLIFIER

Plate Voltage	150 Volts
Suppressor Voltage	0 Volts
Screen Voltage	100 Volts
Cathode-Bias Resistor	560 Ohms
Plate Resistance, approximate	0.15 Megohms
Grid-Number 1 Transconductance	800 Micromhos
Grid-Number 3 Transconductance	515 Micromhos
Plate Current	1.1 Milliamperes
Screen Current	2.1 Milliamperes
Grid-Number 1 Voltage, approximate	
Ib = 10 Microamperes	−4.5 Volts
Grid-Number 3 Voltage, approximate	
Ib = 10 Microamperes	−3.5 Volts

4.5-Megacycle FM Detector—See Circuit Diagram

RMS Input Signal to Grid to Driver Tube	15	200	500	Millivolts
Plate Supply Voltage	250	250	250	Volts
Suppressor Voltage (Obtained from a 560,000-ohm resistor)	−5.0	−6.0	−6.4	Volts
Screen Voltage	100	100	100	Volts
Cathode-Bias Resistor	560	560	560	Ohms
Plate Load Resistor	0.27	0.27	0.27	Megohms
Plate Current	0.23	0.22	0.21	Milliamperes
Screen Current	3.4	5.5	6.0	Milliamperes
Grid-Number 1 Current	0.013	0.6	0.8	Milliamperes
Bandwidth				
For a Total Harmonic Distortion of 10 Percent	65	120	118	Kilocycles
AM Rejection‡, approximate	33	29	28	Decibels
RMS Audio Output Voltage, approximate				
With ±7.5-kc Deviation from Mean Value of 4.5 Megacycles	5.5	6.5	7.5	Volts
With ±25-kc Deviation from Mean Value of 4.5 Megacycles	17	21	23	Volts
Total Harmonic Distortion, approximate				
With ±25-kc Deviation from Mean Value of 4.5 Megacycles	2	3	4	Percent

Sensitivity	
With ±7.5-kc Deviation from Mean Value of 4.5 Megacycles	5§ Millivolts
With ±25-kc Deviation from Mean Value of 4.5 Megacycles	15§ Millivolts

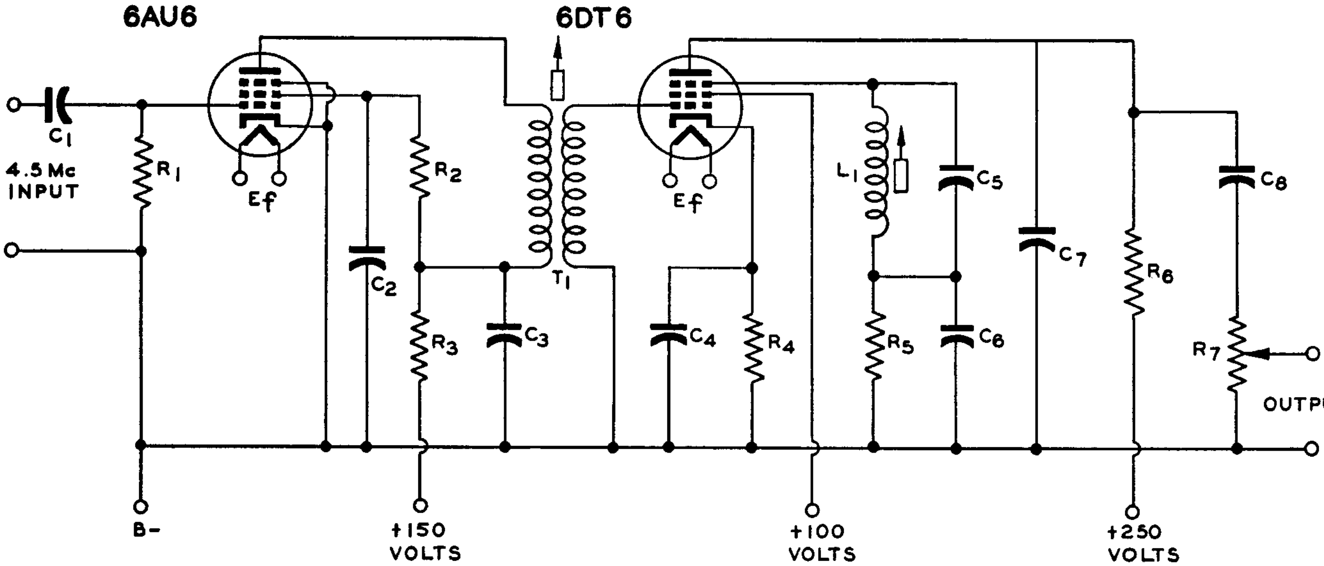
* The time required for the voltage across the heater to reach 80 percent of its rated value after applying 4 times rated heater voltage to a circuit consisting of the tube heater in series with a resistance equal to 3 times the rated heater voltage divided by the rated heater current.

† With external shield (RETMA 316) connected to cathode.

‡ Ratio of the audio output voltage produced by 30-percent amplitude modulation of the 4.5-megacycle carrier frequency to the audio output voltage produced by ±25-kilocycle deviation from the 4.5-megacycle carrier frequency, with a modulating frequency of 400 cps in both cases.

§ Signal level at which detector circuit will handle the indicated deviation in frequency from the mean value of 4.5 megacycles before distortion occurs.

LOCKED-OSCILLATOR, QUADRATURE-GRID DETECTOR CIRCUIT UTILIZING TYPE 6DT6 OR 3DT6



C1 - 47 µµf, 400 VOLTS
C2 C3 - 0.01 µf, 400 VOLTS
C4 - 0.01 µf, 200 VOLTS
C5 - 18 µµf, 200 VOLTS
C6 - 0.05 µf, 200 VOLTS
C7 - 100 TO 1000 µµf, 400 VOLTS
C8 - 0.01 µf, 400 VOLTS

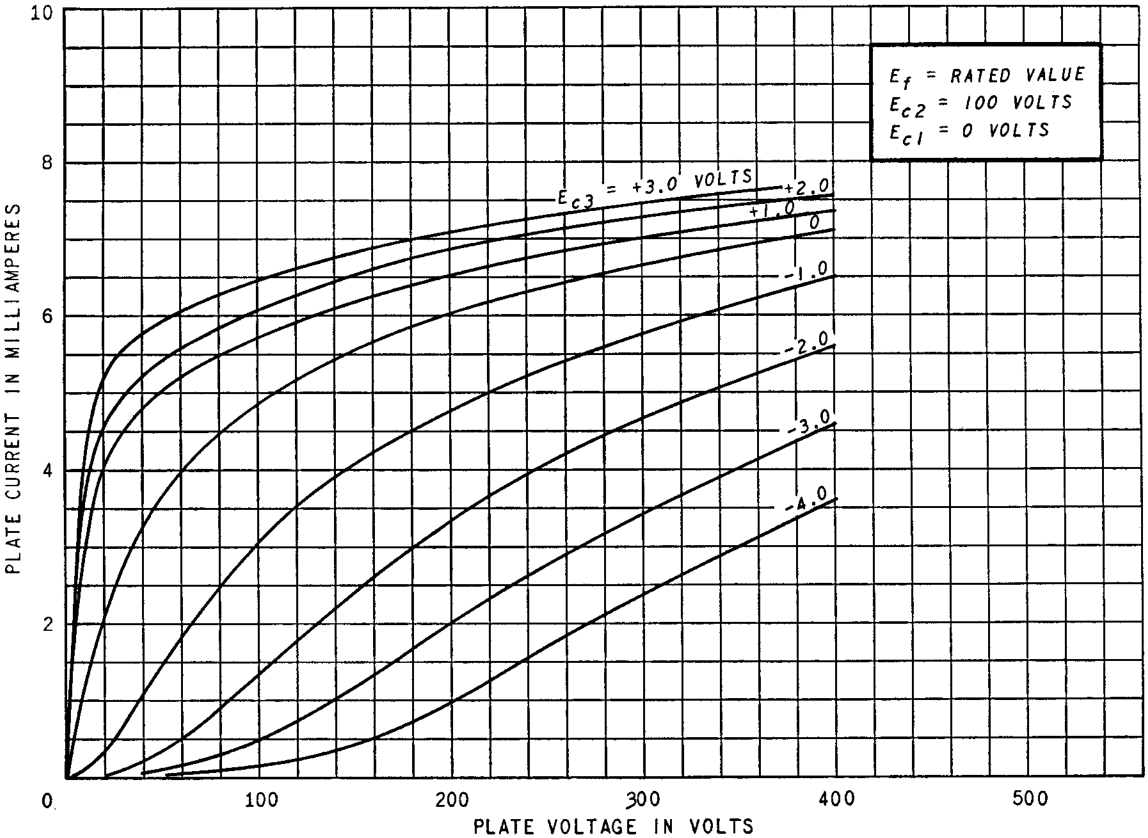
L1 - SLUG-TUNED INDUCTOR WITH Q OF 50 AND TUNEABLE TO 4.5-MC
R1 - 100000 OHMS, 0.5 WATT
R2 - 12000 OHMS, 0.5 WATT
R3 - 1000 OHMS, 0.5 WATT
R4 - 560 OHMS, 0.5 WATT
R5 - 560000 OHMS, 0.5 WATT

R6 - 270000 OHMS, 0.5 WATT
R7 - 0.5 MEGOHM POTENTIOMETER
T1 - SLUG-TUNED, BIFILAR WOUND IF TRANSFORMER WITH RATIO OF 1:1.5, Q > 60, AND TUNEABLE TO 4.5-MC WITH TUBE AND WIRING CAPACITANCE

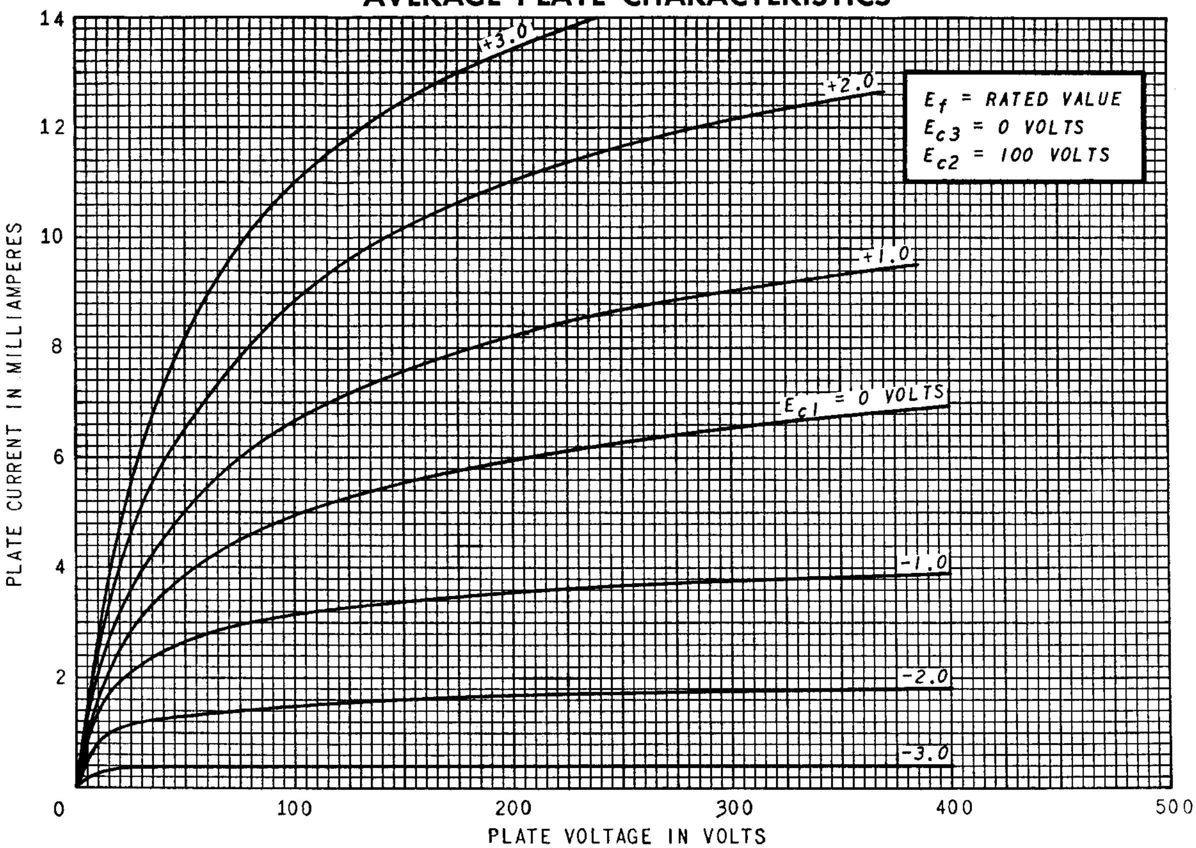
RECOMMENDED ALIGNMENT PROCEDURE

1. Feed a 500-millivolt, 4.5-mc, 400-cps FM-modulated (±25-kc deviation) signal to the input of the driver tube.
2. Adjust L1 for maximum undistorted sound output. Since several maxima may occur during this adjustment, it is important to select the proper one. This is the higher frequency peak and coincides with maximum voltage drop across R5.
3. Reduce the level of the 4.5-mc signal to 5 millivolts RMS.
4. Using an oscilloscope, adjust T1 for a centered discriminator characteristic with oscillation beats at the edges. Alternatively, T1 may be adjusted for maximum d-c voltage across R5.
5. Repeat steps 1 through 4 as necessary to assure accurate alignment.

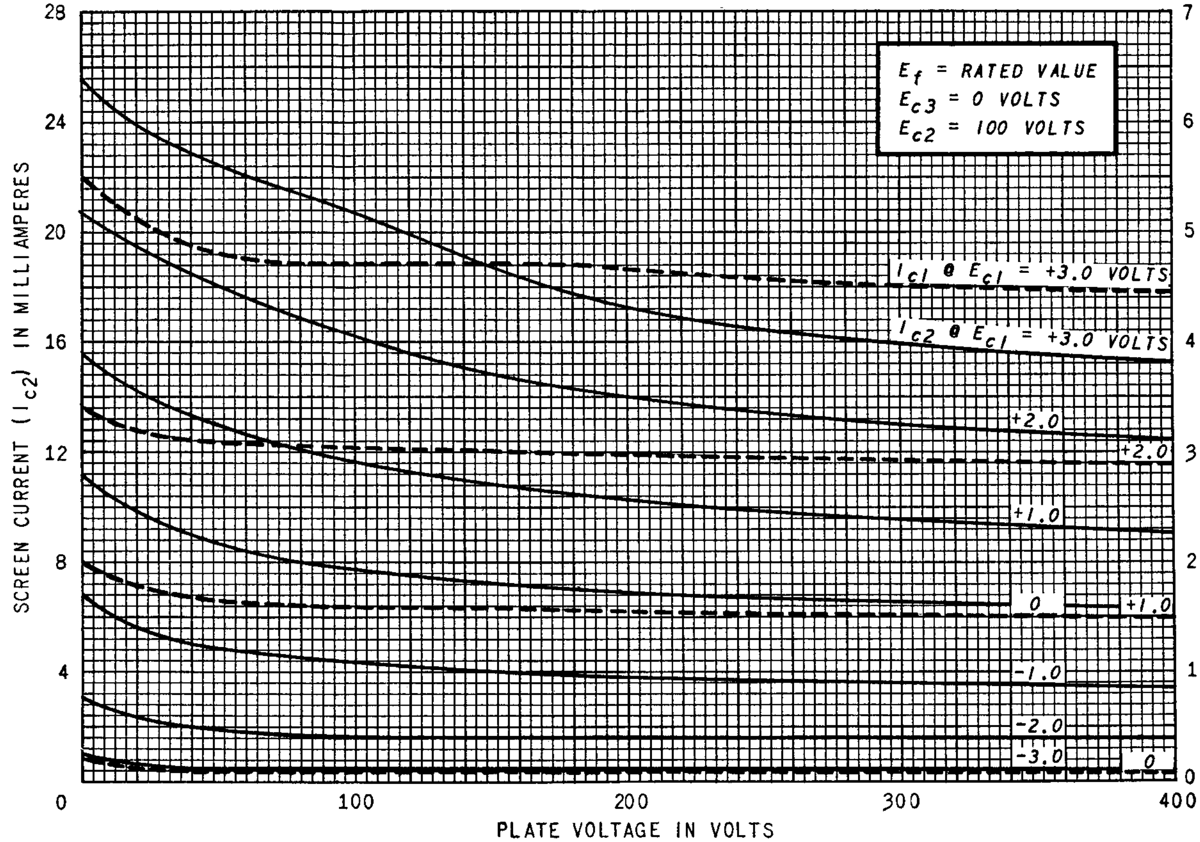
AVERAGE PLATE CHARACTERISTICS



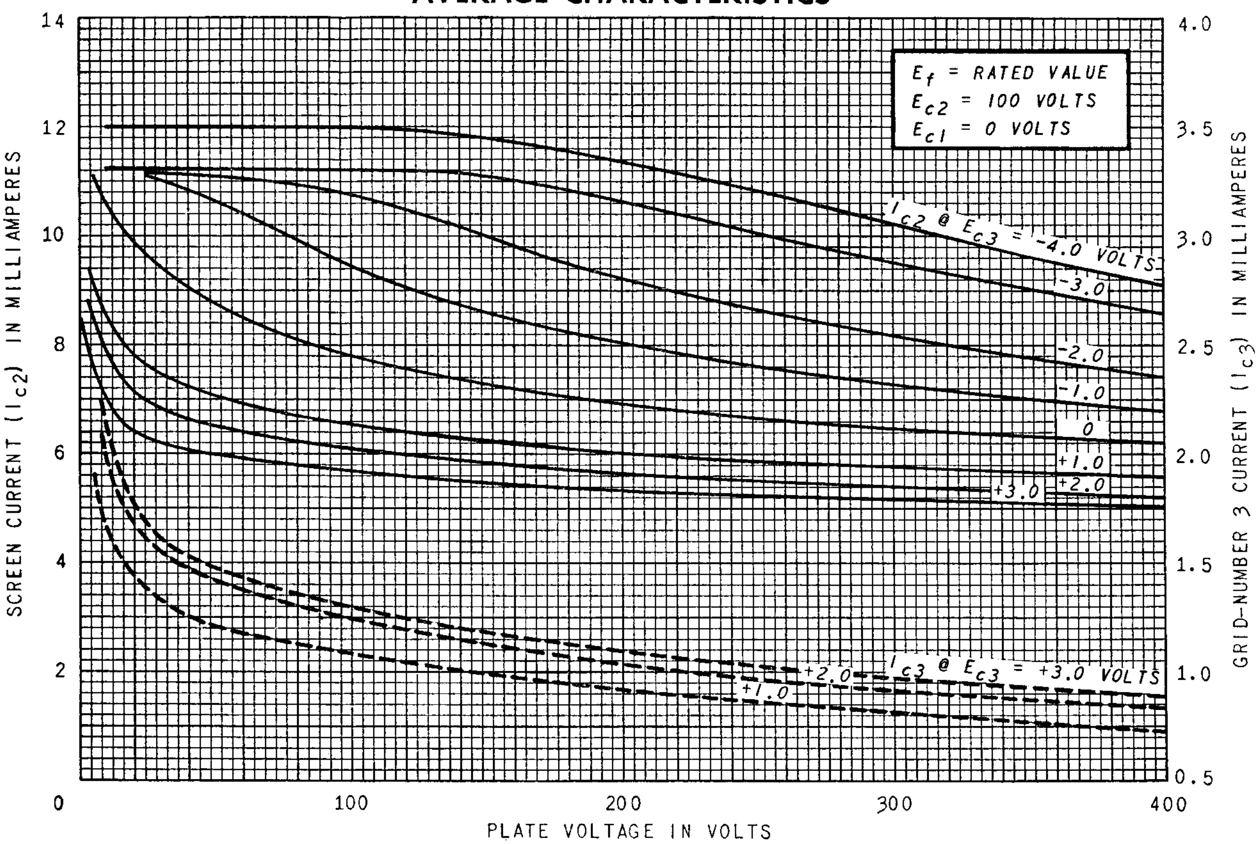
AVERAGE PLATE CHARACTERISTICS



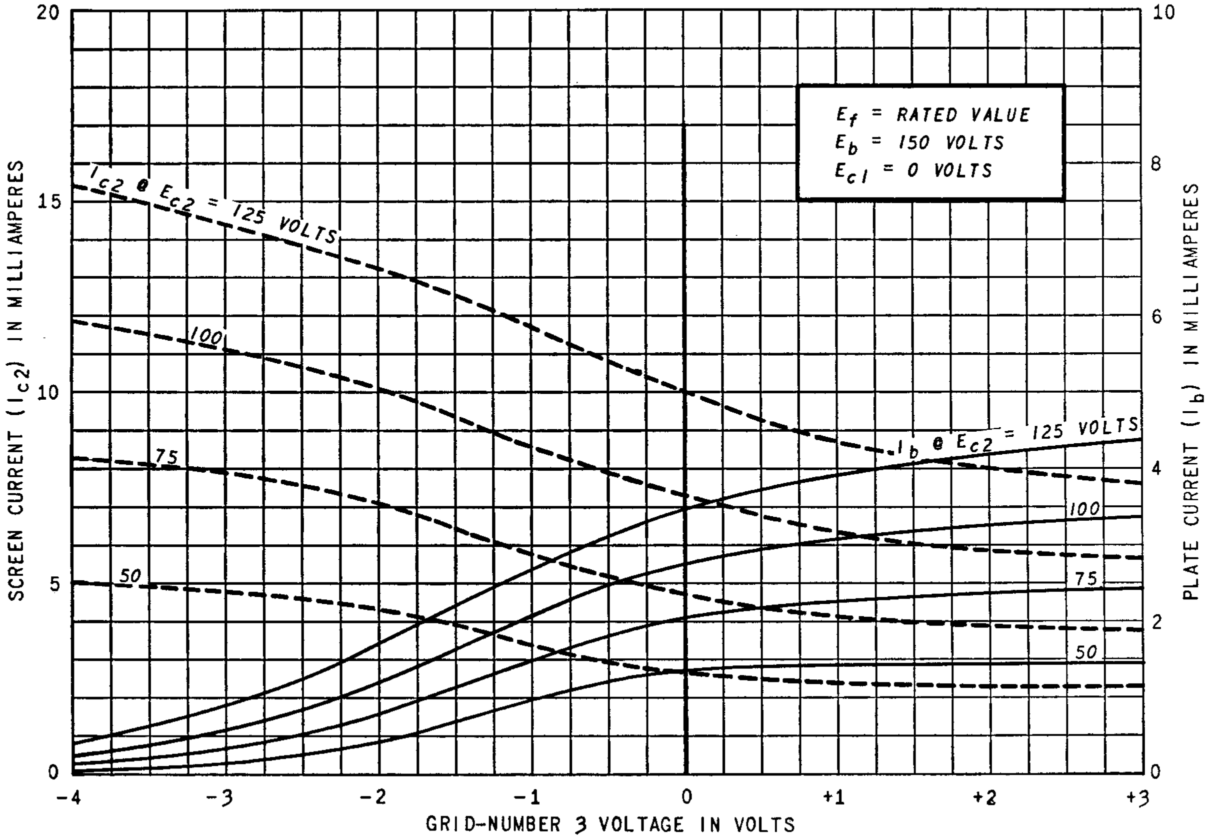
AVERAGE CHARACTERISTICS



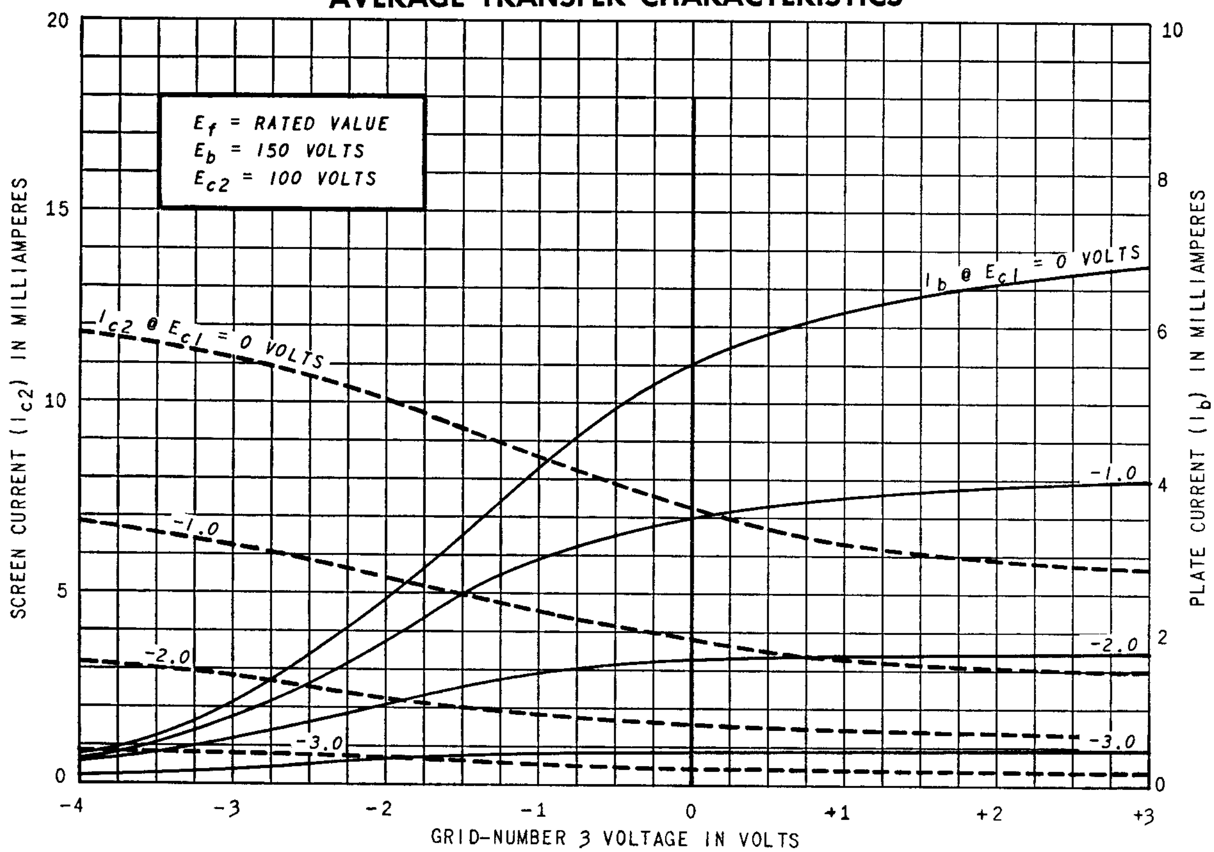
AVERAGE CHARACTERISTICS



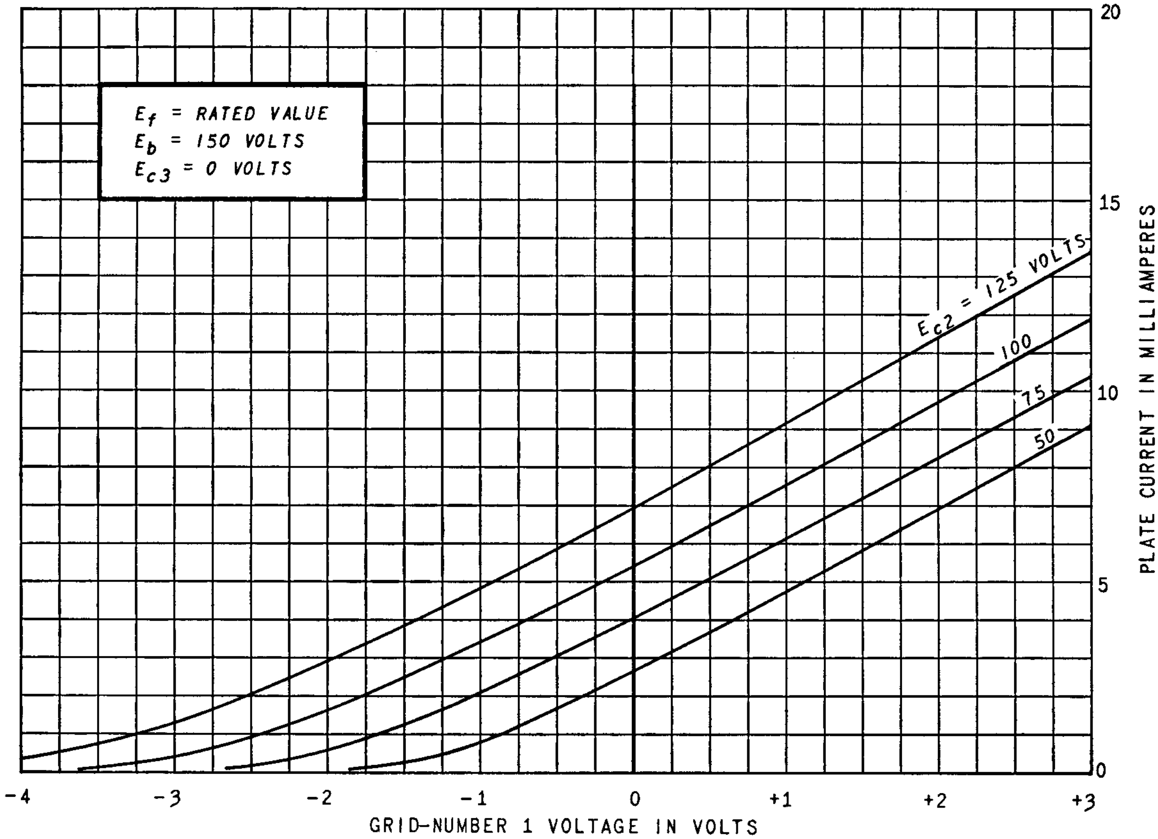
AVERAGE TRANSFER CHARACTERISTICS



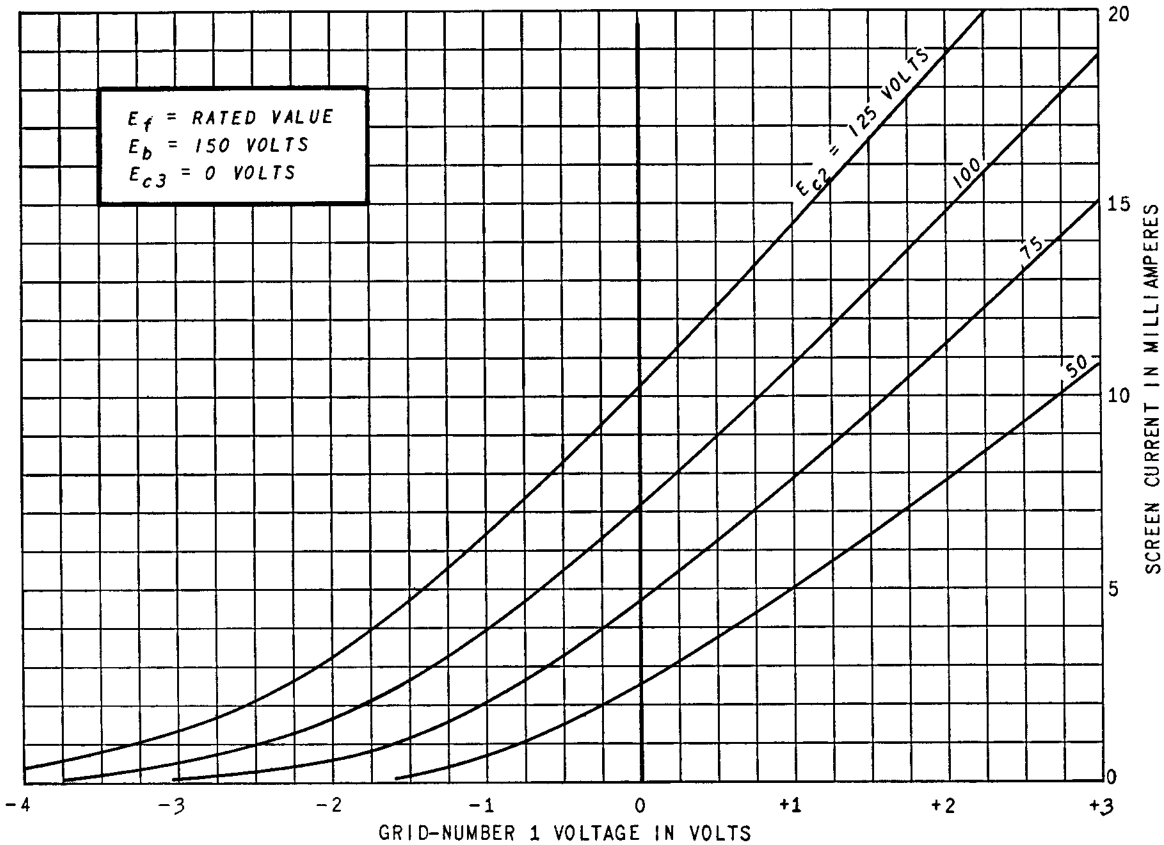
AVERAGE TRANSFER CHARACTERISTICS



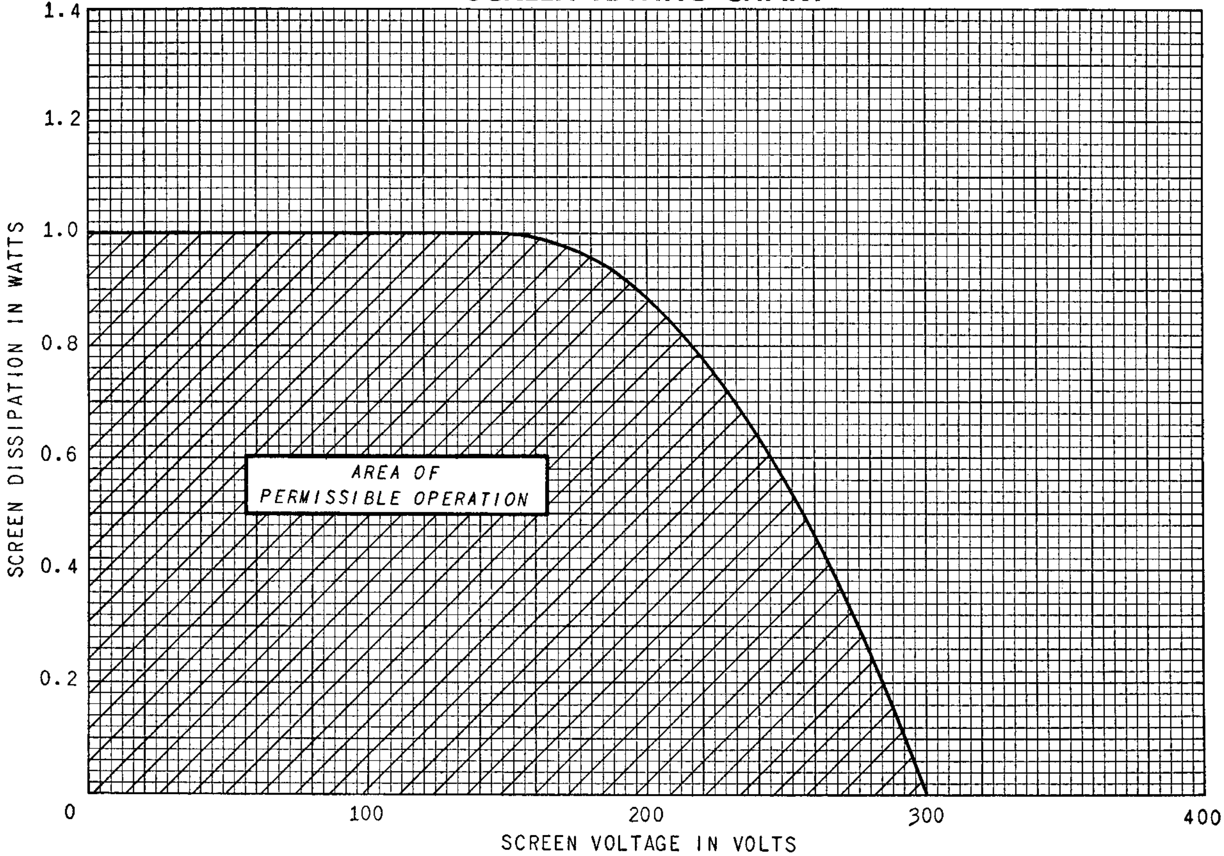
AVERAGE TRANSFER CHARACTERISTICS



AVERAGE TRANSFER CHARACTERISTICS



SCREEN RATING CHART



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